In a careful examination, however, of the whole argument of the authors of the "Unseen Universe," it looks to me as though they saw clearly to what their course of reasoning, as far as this particular point is concerned, tended, but were willing to stop short of the true logical result, believing that humanity was not yet prepared to admit that we are only a small part of one stupendous whole, a universe of individual life.

Of the main object and scope of their argument I have nothing to say, only this: if the premises assumed—and they are the assumptions of the modern school of science—are correct, there is nothing unreasonable in the conclusions at which the authors have arrived.

NOTE.—Since writing the above I have seen the authors' preface to the second edition of the "Unseen Universe," in which they say: "To reduce matters to order, we may confidently assert that the only reasonable and defensive alternative to our hypothesis (or, at least, something similar to it) is the stupendous pair of assumptions that visible matter is *eternal*, and that IT IS ALIVE. If anyone can be found to uphold notions like these (from a scientific point of view), we shall be happy to enter the lists with him." If the distinguished authors will confine themselves to this proposition, that "All visible aggregations of matter, such as our earth and its congeners, are living organisations, in other words, ARE ALIVE," I think the affirmative can be successfully maintained.

Whether matter is eternal and each individual particle or atom of matter is alive, is too far in the interior of the unknowable to be discussed with any possibility of successful results, and, too, the idea of an atom being a living organisation is directly opposed to the whole theory of atomicity, and scientifically ludicrous in view of that theory. JOSIAH EMERY

City of Williamsport, Pa., U.S., March 10

Prof. Tait on the Earth's Age

IT is well known that Sir W. Thomson has concluded, from different lines of argument, that the age of the earth, as a body cool enough for habitation, cannot be much greater than a hundred million years.

Prof. Tait, in his "Recent Advances in Physical Science," recapitulates these arguments, but with a different conclusion. He states the limit of age to be about *ten* million years.

As the subject is of immense interest, may I ask Prof. Tait to explain this change of conclusion? J. D. EVERETT

A Relapsed Donkey

SOME years ago on one of the Lucknow roads I met a "Dhobi" (washerman) with some donkeys. I send you a picture of one of them, made by a native artist. It shows, I think, the relationship between the zebra and the donkey better than many which I have seen. Mules and horses often show zebra marks on their legs, but I have never before or since seen the marks so well displayed on the trunk and legs as in this donkey. The stripes on the body are blended together at their base, and so are the stripes on the legs blended into *bands*. At the time I endeavoured to find out whether in the days of the kings of Oudh there had been any zebra in Lucknow which might have bred with donkeys, but could find nothing about it. Had there been a zebra which bred with donkeys, I think there would have been more of these striped animals; but this is the only one I have seen since 1858. I think it a case of simple *atavism*. Perhaps you may think it worthy of a record in NATURE. All "Dhobis" donkeys are small, wretched creatures, mostly with crooked legs. E. BONAVIA

Lucknow, Feb. 29

OUR ASTRONOMICAL COLUMN

VARIABLE STARS.—Mr. J. E. Gore, M.R.I.A., of Umballa, Punjab, calls attention to a star of the sixth magnitude entered in Harding's Atlas, between ϵ Leporis and B.A.C. 1553, and which is underlined. Mr. Gore says: "In February of this year, with a 3-inch refractor, I found Harding's 6 m. star a little brighter than the 9 m. star south of it, but less than several 8 m. stars (Harding) *following*. It has a small companion *f* at about 1′ ±. Harding's 9 m. stars seem about 10 m." Reading off from the Atlas the position of the sixth magnitude for 1800 appears to have been about R.A. 73° 32′·5, N.P.D. 111° 25′, whence for 1876·0 we have R.A. 4h. 57m. 25s., N.P.D. 111° 18′. This star does not occur in Argelander's Zones, nor in the Washington Zones in the volumes of observations for 1870 and 1871.

Gilliss has this note to No. 543 of his Catalogue of 1248 stars for 1840 (B.A.C. 3815): "Probably variable at very short intervals. Of the seven observations three estimations make it 6th magnitude, three 5th, and the other 5·6." This star, which was observed by Flamsteed, Bradley, Piazzi, and Taylor, was also observed by Argelander on three nights, viz., 1850, March 15, 1851, April 22 and 28, the magnitudes being noted on these occasions, 5, 7, 6 respectively. It appears not unlikely that if this star is examined at short intervals Gilliss's suspicion of variability will be confirmed. It is situate in Hydra R.A. (1876), 11h. 2m. 45s., N.P.D. 117° 25′.

As perhaps connected with the subject of variable stars, we may refer to a remark by Piazzi, applying to his star XVI. 35. He says: "Fortiter micans, intereadem, sequens tranquilla luce splendescit." No. 35 is called 8 m., and the star following 15″, and south 18″, which did not exhibit the strong scintillation of its neighbour, 6 m. Both stars occur in the Washington Zone, 1847, June 17, magnitudes 7·8 and 6·7. Also to the remark attached by Lalande to the star of 8·9 mag. observed on the middle wire at 20h. 35m. 39·5s., 1796, August 23, "Beaucoup de scintillation" ("Histoire Céleste," p. 242); this star is No. 40102 Cygnus, of the reduced catalogue, R.A. (1876), 20h. 39m. 23s. N.P.D. 58° 45′·2. Several of the variable stars are well known to exhibit striking scintillation at times, and perhaps more especially when on the point of diminution; this has been particularly the case with S Virginis (Hind, 1851), in which reddish-yellow star flashes of a deeper red are occasionally present, producing an impression of unusual scintillation.

The star Lalande 34746 Aquila is of a deep orange colour. Its position is erroneously given in the reduced catalogue from the observation 1796, June 25; the N.P.D. should be 96° 43′ 28″·7. It does not occur in the Zones of Bessel or Santini. Lalande calls it 7m., and it is entered of the same magnitude in the charts of Capocci and Inghirami. In September, 1873, it was 7·8, so that at present a claim to be included in the list of variables is not quite made out; still as so large a proportion of the highly-coloured stars do prove to be variable, L. 34746 may be worth watching. Position for 1876·0. R.A., 18h. 38m. 2s., N.P.D., 96° 39′·5.

Several of the variable stars to which attention has been called in this column during the last twelvemonth, are now in favourable positions for observation.

THE SEARCH FOR COMETS.—No new telescopic comet has been detected since that found by M. Borrelly at Marseilles early in December 1874, an interval of more than sixteen months. Perhaps we may attribute this circumstance partly to the very unfavourable weather which has prevailed generally during the last year, but it is pretty certain that if a systematic search for these bodies, with suitable instruments, could be instituted by aid of amateurs of the southern hemisphere, cometary astronomy would be greatly the gainer. Such work is not adapted to the routine of the public observatories, nor can they afford, in the actual state of what may be termed the standard astronomy of the other hemisphere, to devote time to it; but it is an occupation especially within the province of the amateur. If his instrumental means are not equal to the determination of accurate positions, he may content himself with intimating any discovery to the astronomers in charge of the public establishments who, after receiving indication of the approximate position of any new comet, will no doubt secure observations sufficient for the calculation of the orbit. In this way it is highly probable that the number of known comets of short period may be materially increased, since it is only at certain returns

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that conditions favourable to observation in the northern hemisphere occur. The "comet-seeker" properly so called is an instrument much better known on the continent, and probably in America, than in this country. It may be used for much other useful astronomical work, and if the observer is content to be without equatorial mounting, and rely upon star-maps for ascertaining approximate positions, a first-rate instrument of this class need not involve great outlay. It is true, we believe, that the fine comet-seekers of the kind produced by the continental opticians (those of Berlin and Vienna especially) have, like most other things, increased in their cost during the last twenty years or so, but less perfect instruments would doubtless enable an amateur to do excellent work in the above direction.

TO FIND EASTER

A NEW York correspondent sends us the following rule, which he states to be devised by himself, to find the date of Easter Sunday, perpetually :—

To find Easter "for ever."

Divide	By	And call the	
		Quotient	Remainder
The year of our Lord	19	—	a
" "	100	b	c
b...	4	d	e
$b + 8$	25	f	—
$b - f + 1$...	3	g	—
$19a + b - d - g + 15$	30	—	h
c...	4	i	k
$32 + 2e + 2i - h - k$	7	—	l
$a + 11h + 22l$	451	m	—
$h + l - 7m + 114$	31	n	o

n is the number of the month of the year and $o + 1$ is the number of the day of the month on which Easter falls.

PROF. FLOWER'S HUNTERIAN LECTURES ON THE RELATION OF EXTINCT TO EXISTING MAMMALIA[1]

VII.

THE *Carnivora*, as existing at the present day, form a natural group, though very sharply divided into two distinct sections, the Pinniped or aquatic, and the Fissiped or terrestrial forms. The former include the Seals, Walrus, and *Otariæ* or Sea-lions. They differ from the terrestrial carnivora chiefly in modifications of their limbs to suit a semi-aquatic life. In their dentition they also present striking distinctions. Though they have the small incisors, large, pointed, recurved canines, and more or less trenchant molars characteristic of the order ; the incisors depart from the typical number of three above and three below on each side, so constant in the other division, being always less numerous, and the molars are simple and uniform in character, never having one tooth differentiated as the sectorial, and others as tubercular molars. The walrus offers a most remarkable modification of dental organisation, which, being unaccompanied by any other deviation from the general structure of the group affords an important caution against placing too great reliance in classification upon characters derived from teeth alone. It must, however, be noted that a knowledge of the complete dentition of this animal in its early stages shows a nearer conformation to the general type than appears at first sight in an examination of the adult. The existing species of Pinnipedia show some gradational forms between the most aquatic species, and those (as the *Otariæ*) which more nearly resemble the terrestrial Carnivores, and upon the supposition that the former have been gradually differentiated from the latter, it might be hoped that palæontology would have revealed some further stages in the series of modifications. At present, however, this expectation has been disappointed. In fact, the fossil remains of seals and seal-like animals as yet known are not numerous or of very great interest, although when those of the Antwerp crags, where they occur more abundantly than elsewhere, have been completely described (a work upon which M. Van Beneden is at present engaged) we may look for further information about them. At present we know of fragments of skulls, jaws, and principally isolated teeth assigned to Pinnipeds, from various Miocene and Pliocene deposits in France, South Germany, Italy, and Bessarabia. The genus *Pristiphoca*, was founded by Gervais on a jaw found in the Pliocene marine sands of Montpellier ; it belongs to a form apparently allied to *Stenorhynchus* and *Pelagius*. The Miocene species from Aquitaine, known only by isolated teeth, are referred by Delfortrie to the genus *Otaria*. Tusks of animals of great size, and apparently allied to the walrus, have been found in the Antwerp and Suffolk crags, and received the name of *Trichechodon*, and a lower jaw of much interest, as showing a transitional character between the walrus and the more typical seals, also from Antwerp, has been described under the name of *Alachtherium*.

The fissiped carnivora are distinguished from the seals by their limbs being adapted to terrestrial progression, and by their dentition. The latter is best exemplified by that of the dog, which is one of the most average or generalised forms of the order. Its dental formula is $i\ \frac{3}{3}\ c\ \frac{1}{1}\ p\ \frac{4}{4}\ m\ \frac{2}{3} = 42$, thus only wanting the last upper molar to complete the full typical mammalian dentition. The premolar and molar series are much differentiated from each other in characters, and one tooth above and below is distinguished from all the others by its superior size and special attributes, and hence called in descriptive odontology the "sectorial" or "carnassial" tooth. Though the upper and lower "sectorial" have some adaptive similarity, and work against each other like the blades of shears, they are not the homologous teeth, the upper one being the fourth premolar and the lower one the first true molar. The former consists essentially of a more or less compressed blade, consisting of three cusps, and supported on two roots, and an inner lobe supported on a distinct root. The anterior lobe of the blade is very small, the middle one conical, high, and pointed, and the posterior has a compressed, straight, knife-like edge. The lower sectorial has two roots, supporting a crown, consisting, when fully developed of a compressed bilobed blade, a heel, and an inner tubercle. Great modifications in the characters of these teeth occur in the different genera of the sub-order, recent and extinct, but their essential similarity can be traced in all, though sometimes so disguised as to be recognised with difficulty. The teeth in front of sectorials in both jaws are compressed and pointed, those behind them broad and tuberculated.

The existing genus *Canis*, comprising the animals commonly known as dogs, wolves, jackals, and foxes, may be considered as truly cosmopolitan, being distributed on the American continent from Greenland to Patagonia, and throughout the Old World, and even Australia has its wild dog, though this may belong to a feral race, introduced originally by man. True dogs have also been found in a fossil state in Europe and North America, throughout the Pleistocene, Pliocene, and even Miocene periods. Many of these are only known by fragments and

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[1] Abstract of a course of lectures delivered at the Royal College of Surgeons "On the Relation of Extinct to Existing Mammalia, with Special Reference to the Derivative Hypothesis," in conclusion of the course of 1873. (See Reports in NATURE for that year.) Continued from p. 450.

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